DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

National Institutes of Health

National Institute of Dental and Craniofacial Research

National Advisory Dental and Craniofacial Research Council

Summary Minutes

Date: June 8-9, 2000
Place: Building 31, Conference Room 6
National Institutes of Health
Bethesda, Maryland 20892

DEPARTMENT OF HEALTH AND HUMAN SERVICES
NATIONAL INSTITUTES OF HEALTH
NATIONAL INSTITUTE OF DENTAL AND CRANIOFACIAL RESEARCH

MINUTES OF THE
NATIONAL ADVISORY DENTAL AND CRANIOFACIAL RESEARCH COUNCIL

June 8-9, 2000

The 161st meeting of the National Advisory Dental and Craniofacial Research Council (NADCRC) was convened on June 8, 2000, at 8:43 a.m., in Building 31, Conference Room 6, National Institutes of Health (NIH), Bethesda, Maryland. The meeting was open to the public from 8:43 a.m. to 4:42 p.m. on June 8, 2000, and from 9:00 a.m. to 9:30 a.m. on June 9, 2000, followed by the closed session for consideration of grant applications from 9:30 a.m. on June 9 until adjournment at 12:30 p.m. Dr. Harold C. Slavkin presided as Chair.

Members Present:

Dr. Ernesto Canalis
Dr. Marilyn Carlson
Dr. D. Walter Cohen
Dr. Dominick P. De Paola
Dr. Samuel F. Dworkin
Dr. Marjorie K. Jeffcoat
Dr. Harold Morris
Dr. Joan Y. Reede
Dr. E. Dianne Rekow
Dr. Michael P. Rethman
Dr. Martha J. Somerman
Ms. Kim S. Uhrich
Dr. Everett Vokes

Members of the Public Present:

Dr. Michael L. Barnett, Warner-Lambert Company, New York
Dr. Charles Bertolami, Dean, School of Dentistry, University of California at San Francisco
Dr. Robert S. Bolan, Interim President and CEO, American Dental Trade Association, Alexandria, VA
Ms. Terrie Cowley, President, The TMJ Association, Milwaukee, WI
Ms. Linda Hay Crawford, Division of Government and Institutional Relations, American Dental Education Association (ADEA), Washington, D.C.
Dr. John S. Greenspan, Chair, Department of Stomatology, School of Dentistry, University of California at San Francisco
Dr. Deborah Greenspan, Professor, School of Dentistry, University of California at San Francisco
Dr. Marvin F. Grower, Assistant Professor, School of Dentistry, Howard University, Washington, D.C.
Dr. Karl Haden, Division of Educational Policy and Research, ADEA, Washington, D.C.
Dr. John I. Ingle, Lecturer, Endodontics, School of Dentistry, Loma Linda University and Medical Center, Loma Linda, CA
Ms. Gina G. Luke, Division of Government and Institutional Relations, ADEA, Washington, D.C.
Dr. Jonathan McLeod, Manager of Legislative and Regulatory Policy, American Dental Association, Washington, D.C.
Dr. Mary Marazita, Interim Director of Research and Professor, School of Dental Medicine, University of Pittsburgh, PA
Dr. David Mooney, Associate Professor, University of Michigan, Ann Arbor
Dr. Stanley B. Peck, President, American Dental Hygienists' Association, Chicago, IL
Dr. John Rugh, Professor, University of Texas Health Sciences Center, San Antonio, TX

Dr. Eli Schwarz, Executive Director, American Association for Dental Research and International Association for Dental Research, Alexandria, VA
Mrs. Lois Slavkin, Past Executive Director, Center to Advance PreCollege Science Education, University of Southern California, Los Angeles
Dr. Philip Stashenko, Senior Member of Staff, The Forsyth Institute, Boston, MA
Dr. Van P. Thompson, Professor, University of Medicine and Dentistry of New Jersey, Newark
Ms. Joan B. Wilentz, Science Writer and Editor, Chevy Chase, MD
Ms. Mary Woolley, President, Research! America, Alexandria, VA

Federal Employees Present:

National Institute of Dental and Craniofacial Research:

Dr. Bruce Baum, Chief, Gene Therapy and Therapeutics Branch, Division of Intramural Research (DIR)
Ms. Carolyn Baum, Committee Management Specialist and Council Secretary, Office of Science Policy and Analysis (OSPA)
Ms. Carol M. Beasley, Chief, Human Resources Management Branch, Office of Administrative Management (OAM)
Dr. Henning Birkedal-Hansen, Scientific Director, NIDCR, and Director, DIR
Ms. Karina Boehm, Chief, Health Promotion Branch, Office of Communications and Health Education (OCHE)
Dr. Norman S. Braveman, Associate Director, Office of Clinical, Behavioral, and Health Promotion Research, Division of Extramural Research (DER)
Dr. Patricia S. Bryant, Health Scientist Administrator, Behavioral and Health Promotion Research, DER
Ms. Sharrell S. Butler, Diversity Program Manager, Office of the Director (OD)
Ms. Nandita Chopra, Program Analyst, OSPA
Dr. Lois K. Cohen, Associate Director for International Health, and Director, Office of International Health (OIH)
Mr. George J. Coy, Chief, Financial Management Branch, OAM
Mr. Kevin L. Crist, Grants Management Specialist, DER
Dr. Scott Diehl, Deputy Acting Chief, Craniofacial Epidemiology and Genetics Branch, DIR
Dr. Raymond Dionne, Clinical Director, NIDCR; Chief, Clinical Pharmacology Unit, DIR; and Acting Chief, Pain and Neurosensory Mechanisms Branch, DIR
Ms. Jody Dove, Public Information Specialist, Public Information and Liaison Branch (PILB), OCHE
Ms. Yvonne H. du Buy, Associate Director for Management, and Director, OAM
Ms. Judith Dulavich, Personnel Specialist, OD
Ms. Kim Ferguson, Grants Technical Assistant (GTA), DER
Mr. William A. Foley, Grants Clerk, Grants Management Branch (GMB), DER
Ms. Karen Fowler, Public Affairs Specialist, Health Promotion Branch, OCHE
Ms. Christen Gibbons, Computer Specialist, Office of Information Technology (OIT), OD
Dr. Kenneth A. Gruber, Chief, Chronic Diseases Branch, DER
Dr. J. Silvio Gutkind, Chief, Oral and Pharyngeal Cancer Branch, DIR
Ms. Denise Halley, GTA, DER
Dr. H. George Hausch, Chief, Scientific Review Branch (SRB), DER
Ms. Deane K. Hill, Computer Programmer, Planning, Evaluation, and Legislation Branch, OSPA
Ms. Lili Huang, GMB, DER
Ms. Lorrayne Jackson, Diversity Programs Specialist, and Co-Director, Diversity Programs, DER
Dr. Bernard W. Janicki, Special Assistant for Planning, Technology Transfer, and Management, DER
Ms. Susan M. Johnson, Chief, PILB, OCHE
Dr. Dushanka V. Kleinman, Deputy Director, NIDCR, and Executive Secretary, NADCRC
Dr. Eleni Kousvelari, Chief, Biomaterials, Biomimetics, and Tissue Engineering Branch, DER
Ms. Victoria La Rock, GMB, DER
Ms. Wendy A. Liffers, Director, OSPA
Dr. James A. Lipton, Assistant Director, Office of Training and Career Development, DER
Dr. Yujing Liu, Scientific Review Administrator, DER

Dr. Jack London, Special Assistant to the Director, DIR
Dr. Dennis F. Mangan, Chief, Infectious Diseases and Immunity Branch, DER
Dr. J. Ricardo Martinez, Director, DER
Dr. Yuan Bo Peng, IRTA Fellow, DIR
Mr. Bill Powell, GMB, DER
Dr. Maryann Redford, Health Scientist Administrator, Office of Clinical, Behavioral, and Health Promotion Research, DER

Dr. Edward Rossomando, Technology Transfer Program Director, OD
Dr. Martin Rubinstein, Chief, GMB, DER
Dr. Denise Russo, Program Administrator, AIDS Program, Infectious Diseases and Immunity Branch, DER
Dr. Ann L. Sandberg, Chief, Neoplastic Diseases Branch, and Director, Comprehensive Centers of Discovery Program, DER
Ms. Patricia Sheridan, Writer, OCHE
Dr. Yasaman Shirazi, Scientific Review Administrator, DER
Dr. Harold C. Slavkin, Director, NIDCR
Dr. Judy A. Small, Chief, Craniofacial Anomalies and Injuries Branch, DER
Ms. Bonnie J. Smith, Grants Management Specialist, DER
Ms. Cheryl Stevens, Special Assistant for Operations, OD
Dr. Sharon Wahl, Chief, Oral Infection and Immunity Branch, DIR
Ms. Tracy Walker, Secretary, OSPA
Dr. Philip Washko, Scientific Review Administrator, DER
Ms. Dolores A. Wells, Program Analyst, OD
Ms. Mary Ann Williamson, Computer Specialist, OIT, OD
Dr. Kenneth Yamada, Chief, Craniofacial Developmental Biology and Regeneration Branch, DIR
Dr. Hsiu-Ying Yang, Pharmacologist, DIR

Other Federal Employees:

Dr. Mohandas Bhat, Senior Science Advisor, U.S. Department of Energy
Dr. C. R. Buchanan, Deputy Director for Dentistry, Department of Veterans Affairs, Washington, D.C.
Dr. Priscilla Chen, Center for Scientific Review (CSR), NIH
Dr. Fred Eichmiller, Director, Paffenbarger Research Center of the ADA Health Foundation, National Institute of Science and Technology (NIST), Department of Commerce (DOC), Gaithersburg, MD
Dr. Caswell A. Evans, Project Director and Executive Director, Surgeon General's report on oral health, and Assistant Director, Los Angeles County Department of Health Services, California
Cpt. Gary Kaplovitz, Dental Officer, U.S. Coast Guard
Dr. Daniel McDonald, CSR, NIH
Dr. Francis M. Wang, Paffenbarger Research Center of the ADA Health Foundation, NIST, DOC, Gaithersburg, MD

OPEN PORTION OF THE MEETING

I. CALL TO ORDER AND WELCOMING REMARKS

Dr. Harold C. Slavkin, Director, NIDCR, called the meeting to order, welcoming all attendees to the 161st meeting of the Council. He invited the attendees to introduce themselves. For the first time, the Council meeting was shown worldwide on a simultaneous NIDCR WebCast.

Dr. Dushanka V. Kleinman, Deputy Director, NIDCR, noted that the agenda for the meeting was entitled "A Celebration of the Hal Slavkin Years: A Look At Where We Are and Where We Are Going." This agenda was constructed to honor Dr. Slavkin for his leadership of the Institute over the past 5 years. On July 1, Dr. Slavkin

departs the NIDCR to return to the University of Southern California, Los Angeles, to serve as dean of the School of Dentistry.

Dr. Kleinman commented that Dr. Slavkin was selected as the sixth director of NIDCR in 1995 and that his tenure has been marked by many accomplishments. She noted that Dr. Slavkin had conceptualized and planned the best possible position for the NIDCR during a time of major Government changes and cutbacks and that he had led the Institute through a broad, inclusive strategic planning effort. Dr. Slavkin also guided the restructuring of NIDCR's research portfolio, creation of new partnerships, renovation of laboratories and offices, extension of the Institute's communication capabilities, initiation of leadership training and career development programs for employees, and expansion of NIDCR science transfer and science education activities. These and other accomplishments are conveyed on the NIDCR home page.

Dr. Kleinman noted that the agenda particularly reflected Dr. Slavkin's three goals for the Institute: scientific excellence in the intramural program; scientific excellence in the extramural program; and communication, communication, communication. She invited the attendees to listen to the presentations, to "dream about what can be" in the future, and to "offer food for thought" for discussion. Following the meeting on June 8, a dinner to honor Dr. Slavkin further was held at the Bethesda Naval Club, Bethesda National Naval Medical Center, Bethesda, MD.

II. APPROVAL OF MINUTES

The minutes of the Council's meeting on January 20-21, 2000, were considered and unanimously approved.

III. FUTURE COUNCIL MEETING DATES

The following dates for future Council meetings were confirmed:

September 21-22, 2000

January 22-23, 2001
June 12-13, 2001
September 24-25, 2001

January 28-29, 2002
June 10-11, 2002
September 26-27, 2002

IV. REPORT OF THE DIRECTOR

Dr. Harold C. Slavkin, Director, NIDCR, commented on the breadth of Institute activities since the previous Council meeting, and he noted several recent exciting events involving the NIDCR. He commented, in particular, that the past 4.5 months have been remarkable for the thinking and attention that government has given to major health issues for the American people (e.g., health disparities, diversity in the workforce, child health, available academic and research health personnel, integration of oral health and overall health. Significant public events highlighting these issues include the Federal Government's release, on January 24-28, of Healthy People 2010, which sets forth the nation's health goals, particularly for children; the publication and release of major health documents at the state level (e.g., "The Oral Health Crisis in Massachusetts," issued in February); and the convening of the Surgeon General's Workshop on Children and Oral Health, held in Washington, D.C., on March 19. This workshop precedes the Surgeon General's Conference on the Face of a Child, which will be held in Washington, D.C., on June 12-13.

Coincident with these events was the publication and release, on May 25, of the first-ever Surgeon General's report on oral health. Dr. Slavkin noted that this report, entitled "Oral Health in America: A Report of the Surgeon General," is already having an effect worldwide and will be used by the NIDCR and its constituents to engage the Government to move forward the agenda for oral health. One of the exciting steps that NIDCR staff have taken is to develop a new curriculum supplement in oral health for preschool and primary grades. This curriculum, entitled "Open Wide and Trek Inside," utilizes the mouth as a laboratory for inquiry-based, problem-solving learning. Developed with the participation of the Shepherd Elementary School in Washington, D.C., the curriculum is culturally neutral, as demonstrated in pilot tests made at a number of primary schools throughout the country. The NIDCR anticipates that it will ready for distribution to elementary school teachers in fall 2000.

Dr. Slavkin emphasized that the scientific community and the public need to be open to new, unforeseen possibilities as biomedical and behavioral research unfolds in the 21st century. Individuals will need to constantly revise their thinking and to rethink existing models as new information and paradigms arise. The recent breakthroughs in stem cell biology, which may make it possible to regenerate parts of the body, are just one example of the dramatic scientific changes taking place and the issues that need to be addressed in relation to society's values and ethics.

The need for reassessment and reinterpretation also applies to the scientific infrastructure--academic health centers, schools of dentistry or medicine, and research training programs. Dr. Slavkin suggested, for example, that training which encourages "porosity" among all the health professions may be more appropriate and effective for solving complex scientific problems in the future than traditional, discipline-based approaches. For the dental and craniofacial research community, the opportunities to "tease apart" the interrelationships between oral health and disease and overall health and disease are enormous, and the training of health professionals will need to be reexamined in terms of the new understanding.

In closing, Dr. Slavkin suggested that the scientific community and the public have "a golden opportunity" to make a difference by choosing to eradicate health disparities and to develop a scientific workforce that reflects the nation's demographics. He thanked the participants for the special celebratory Council meeting and for the privilege of being part of the experience. He noted that the recent "Varmus years" have been an exciting time in biomedical research as the nation has made a commitment to infuse resources into the scientific enterprise. This new commitment is enabling the NIH to take greater advantage of scientific opportunities, fund more and larger research grants, and expand recruitment efforts.

Dr. Slavkin's written Director's Report to the NADCRC was provided previously to the Council members and is appended to these minutes as Attachment III.

V. RESEARCH! AMERICA HARRIS POLL FINDINGS: PERSPECTIVES FROM THE PUBLIC

Ms. Mary Woolley, President, Research! America, Alexandria, VA, presented the results of a seminal national poll commissioned by Research! America to assess the public's attitudes on oral health, dental insurance, and oral health research. Research! America is an alliance of more than 400 member institutions, including approximately 30 organizations from the dental and craniofacial community, which are committed to making medical and health research a higher national priority. The alliance aims to communicate research discoveries in health to the public and to enhance public understanding of the benefits of medical and health research.

In May, the Harris Interactive group conducted a telephone survey for Research! America of a nationwide sample of approximately 1,000 U.S. adults. Ms. Woolley emphasized that the survey results are tools that can be used by individuals in the research community to argue for increased investment in research to improve health and reduce health disparities. The findings indicate that oral health is important to the public; that individuals perceive that their own oral health is good; and that the public associates oral health with overall health. The data from the survey show that 85 percent of the respondents said that oral health is very important to their overall health. In addition, 25 percent said they have excellent oral health and 51 percent said they have good oral health--percentages that are similar to those regarding overall health (25 percent said they have excellent overall health, 53 percent said they have good overall health).

Ms. Woolley noted that individuals who were older or had lower socioeconomic status were more likely to say that their oral health is fair or poor, compared to other groups. According to the data, the public's top concerns regarding oral health are gum disease, gingivitis, and bleeding gums (70 percent) and cavities, caries, and tooth decay (29 percent). Ms. Woolley noted that the concerns expressed, which varied somewhat between younger and older adults, could be the focus of targeted messages from the research community.

The findings also indicate significant disparities in oral health and overall health. The responses indicate that most of the public has visited a dentist within the past 12 months (72 percent), but a large percentage (34 percent) do not have dental health insurance. Individuals older than 65 and those with less than a high school education were less likely to have visited a dentist recently than were other groups. The top reasons for visiting a dentist were for a checkup, examination, or cleaning (66 percent) and treatment of a condition or problem (32 percent). The top reasons for *not* visiting a dentist were lack of dental insurance (21 percent), particularly among women, and lack of teeth (20 percent). The major reasons cited for not having dental insurance were the high cost of insurance (38 percent) and the lack of coverage from employers (23 percent). The respondents indicated that the desire to prevent oral disease was a major factor in their determination to obtain dental care and that fear of pain or of going to the dentist was not important.

Significantly, only 13 percent of the respondents said they are very well informed about oral health research on conditions, diseases, techniques, treatments, or devices. Another 31 percent said they are not very well informed, and 51 percent said they are somewhat well informed. Whites and individuals with more education were more likely to say they were well informed than were nonwhites and individuals with less education. Ms. Woolley noted that these data suggest an enormous opportunity for identifying effective ways for communicating oral health information to different population groups. She also said that support for doubling the funding for Government-supported oral health research over 5 years is strong, with 55 percent saying "yes," versus 34 percent saying "no."

In closing, Ms. Woolley emphasized that the data provide "ammunition" for champions of oral health research, and she issued a call to action to the research community to use the data as a "hook" to "keep the story alive" that is presented in the Surgeon General's report. She challenged the participants to take time now to communicate the important messages in the Surgeon General's report in public and political ways (e.g., through letters to newspaper editors, contacts with elected officials). Referring to one of Dr. Slavkin's three goals for the NIDCR, Ms. Woolley emphasized the importance of "communication, communication, communication." She invited the participants to contact Research! America for additional suggestions on

how to make a difference and to discuss strategies for disseminating the data more widely to the scientific community and health consumers. All the data are publicly available from Research! America.

The Council congratulated and thanked Ms. Woolley for the baseline data. In discussion, Ms. Woolley noted that the data reflect the perceptions of the individuals surveyed, which may not represent the realities of their circumstances, and they indicate themes and messages which the research community could pursue in communications with the public.

VI. THE SURGEON GENERAL'S REPORT ON ORAL HEALTH: A CALL TO ACTION

Dr. Caswell A. Evans, Project Director and Executive Director, Surgeon General's report on oral health, reviewed the contents of the report and the presentation of the report in the national media. Copies of the executive summary and the full report were provided to the Board, and the report is available on the NIDCR home page. Additional hard copies of the report will be available in August from the NIDCR and the Government Printing Office. The Executive Summary, press release, and pre-release materials also will be available in Spanish.

Dr. Evans acknowledged the contributions of many individuals to the report. He particularly thanked Dr. Kleinman; Ms. Joan Wilentz, Science Writer and Editor; the 200-plus coordinating authors and contributing authors and reviewers; and the Federal Coordinating Committee. Dr. Evans emphasized that the report is the Surgeon General's report and, as such, is a rare and "uncommon" document. The report also is endorsed by Secretary Donna E. Shalala of the Department of Health and Human Services.

The charge, in preparing the report, was to define, describe, and evaluate the interaction between oral health and general health and well-being through the lifespan in the context of changes in society. Dr. Evans said that the report's organization reflects this charge and centers on five questions: What is oral health? What is the status of oral health in America? What is the relationship between oral health and general health and well-being? How is oral health promoted and maintained and how are oral diseases prevented? What are the needs and opportunities to enhance oral health?

The report presents several major themes, a list of major findings, and a framework for action. The major findings, which reflect the themes of the report, are: Oral diseases and disorders in and of themselves affect health and well-being throughout life; safe and effective measures exist to prevent the most common dental diseases--dental caries and periodontal diseases; lifestyle behaviors that affect general health such as tobacco use, excessive alcohol use, and poor dietary choices affect oral and craniofacial health as well; there are profound and consequential oral health disparities within the U.S. population; more information is needed to improve America's oral health and eliminate health disparities; the mouth reflects general health and well-being; oral diseases and conditions are associated with other health problems; and scientific research is key to further reduction in the burden of diseases and disorders that affect the face, mouth, and teeth. Dr. Evans noted several "take-home" messages: Oral health is essential to general health; oral health can be achieved; not all Americans are benefitting fully from the potential to promote their oral health and prevent oral disease; and coordinated action is needed at all levels of society to address the gaps and overcome barriers.

The framework for action suggested in the report includes development of a National Oral Health Plan to eliminate health disparities and improve quality of life. The principal components of the plan are as follows: Change the perceptions of the public, policymakers, and health providers regarding oral health and disease; accelerate the building of the science and evidence base and apply science effectively to improve oral health; build an effective infrastructure that meets the oral health needs of all Americans and integrates oral health effectively into overall health; remove known barriers between people and oral health services; and use public-private partnerships to improve the oral health of those who still suffer disproportionately from oral diseases. Dr. Evans noted that the rationale for these actions, presented throughout the report, offers excellent "springboards" or platforms for additional initiatives, new research, and new programs. He emphasized that the report is not only a didactic tool containing much information,

but also a "rowboat," "barge," or "racing sleuth" that needs human action and direction to move the agenda for oral health forward.

Dr. Evans commented that the report has received substantial attention by both local and national media, including widespread newspaper coverage and at least 280 television "spots." For usage by the media, the NIDCR and the Surgeon General's Office prepared a Public Service Announcement (PSA) which highlighted the report's release, filmed at the Shepherd Elementary School in Washington, D.C.; statements by Surgeon General David Satcher and Secretary Shalala; and the main themes in the report. The Council viewed the PSA and a videotape of 10 segments compiled from national, televised news coverage. Dr. Evans noted that, in contrast to the PSA, the news media focused on oral health as specifically related to teeth only and on local or state "rollouts" of the report. Much of the coverage related to the "silent epidemic" of oral disease among poor and minority populations, the dearth of dental insurance coverage, the prevalence of oral disease among children, and the benefits of fluoride.

In discussion, Dr. Evans suggested that the findings and actions presented in the report have clear implications for the future of dental education, research, and practice and that the report should serve as a seminal document for developing dental school curricula. Ms. Gina G. Luke, of the American Dental Education Association (ADEA), noted that the ADEA is reviewing the report, preparing an initial response, and printing and disseminating copies to dental school deans and other leaders in dentistry.

VII. SCIENCE AND THE DIVISION OF INTRAMURAL RESEARCH

Dr. Henning Birkedal-Hansen, Scientific Director, NIDCR, and Director, Division of Intramural Research (DIR), reported that the DIR was reorganized and has made great progress since Dr. Slavkin became director of the NIDCR. In honor of Dr. Slavkin, he invited the participants to peruse highlights of DIR's scientific accomplishments, communicated in a series of posters presented by the chiefs of DIR's seven branches as a session entitled "Harold Slavkin Years: 1995-2000." A poster of Dr. Slavkin's intramural research, conducted within the Craniofacial Development Section of the National Institute of Arthritis and Musculoskeletal and Skin Diseases, was included. Dr. Kleinman noted that the NIDCR would maintain the posters for the coming weeks and download them onto the NIDCR home page, as possible, to share with the broader research community.

In its poster, the Craniofacial Developmental Biology and Regeneration Branch, led by Dr. Kenneth Yamada, celebrated accomplishments in discovering novel genes for human oral and craniofacial development and in characterizing the functions of newly identified proteins. Branch scientists are applying advanced technologies in their research, including in situ hybridization, fluorescent time-lapse microscopy, "knockout" and transgenic mice, and organ culture analysis. The Craniofacial Epidemiology and Genetics Branch, currently headed by Dr. Scott Diehl, presented several studies, of oral cancer, nasopharyngeal cancer, cleft lip and palate, periodontal diseases, and phantom limb pain. The Craniofacial and Skeletal Diseases Branch, led by Dr. Pamela Gehron Robey, highlighted clinical research and research applications of investigations of cells, genes, matrix proteins, animal models, and skeletal conditions, particularly fibrous dysplasia and McCune-Albright syndrome. The Gene Therapy and Therapeutics Branch, headed by Dr. Bruce Baum, presented research on the role of the secretory $Na^{+}K^{+}2Cl^{-}$ cotransporter in secretion of salivary fluid, the role of calcium influx in regulating fluid secretion from acinar glands in the salivary glands, the biology of adeno-associated viruses and gene transfer, and the use of salivary glands as a unique target site for gene transfer. The branch also maintains the Sjögren's Syndrome Clinic.

The Oral Infection and Immunity Branch, led by Dr. Sharon Wahl, noted organizational changes made during the past 5 years to implement a new vision, create a bench-to-bedside program, enhance recognition of the research area, renovate laboratories, and initiate scientific studies. The Oral and Pharyngeal Cancer Branch, guided by Dr. J. Silvio Gutkind, presented research on basic mechanisms of normal and aberrant cell growth, a genomic approach to oral cancer, animal models for squamous carcinogenesis, tissue remodeling and cancer, and novel treatment approaches for oral cancer. The Pain and Neurosensory Mechanisms Branch, currently headed by Dr. Raymond Dionne, celebrated advances in elucidating the

circuitry of pain pathways, the transmission of pain, and the imaging of chronic pain. Dr. Slavkin's intramural laboratory highlighted research on the fate and determination of cranial neural crest cells, the role of the human dachschund (DACH) gene in embryonic patterning, and the growth and development of the cranial base.

VIII. HIGHLIGHTS OF SCIENCE AND RESEARCH TRAINING: EXTRAMURAL PERSPECTIVES

Dr. J. Ricardo Martinez, Director, Division of Extramural Research (DER), introduced the afternoon session, which was devoted to highlights of science and research training within DER. Dr. Martinez noted that, during the past 5 years, NIDCR expanded its scientific boundaries remarkably, largely due the energy, drive, and vision of Dr. Slavkin. He also noted that, with the dedicated efforts of NIDCR staff, the Institute moved its science base into the mainframe of biomedical research, increased its research portfolio significantly, developed and implemented many exciting and new initiatives at the cutting edge of science, and stimulated cross-disciplinary interactions between investigators and institutions. Over the 5-year period, the NIDCR issued more than 80 Requests for Applications (RFAs), constituted and energized six research program areas, and established Comprehensive Oral Health Research Centers of Discovery.

For the session that followed, extramural staff and grantees presented selected highlights of NIDCR activities in Biomimetics and tissue engineering, craniofacial genetics, and research training and career development. Dr. Martinez said that the NIDCR has led the NIH in the expansion of research on Biomimetics and tissue engineering and was a leader in the development of the Bioengineering Consortium (BECON), a trans-NIH initiative. He also noted that emphasis on craniofacial genetics, as reflected in the Institute's recent name change, derives from Dr. Slavkin's own research interests and advances in the field. In addition, Dr. Slavkin has stimulated new initiatives in research training and career development, including the NIDCR Blue Ribbon Panel on Research Training and Career Development to Meet Scientific Opportunities of the 21st Century.

Biomimetics and Tissue Engineering

Dr. Eleni Kousvelari, Chief, Biomaterials, Biomimetics, and Tissue Engineering Branch, DER, noted that the NIDCR organized this extramural branch in response to Dr. Slavkin's forward vision and the advice of the extramural community and the Council. The branch's "blueprint" for research reflects the recommendations of two major conferences: the Symposium on Biomaterials and Medical Implant Science, held in 1995, the first of its kind at the NIH; and the NIDCR Workshop on Biomimetics, Tissue Engineering, and Biomaterials, held in September 1996. The second conference, in particular, engaged experts from many different fields, stimulated partnerships among the NIH institutes, and inspired a new NIH paradigm for reviewing multidisciplinary applications from science and engineering.

Dr. Kousvelari noted that Dr. Slavkin's vision of bioengineering as a trans-NIH activity, NIH's enthusiasm for this research, and expansion of the NIDCR portfolio have led to a dramatic increase in NIDCR's visibility within the NIH and other Federal agencies. She also commented on the significance and overlapping nature of research on biomimetics and tissue engineering. She noted that the NIDCR supports research on every tissue of the orofacial complex, and she thanked Dr. Slavkin for his vision and support of the entire program area.

Dr. David Mooney, Associate Professor, University of Michigan, Ann Arbor, summarized past and present research on tissue engineering, examples of his NIDCR-supported research on applications to dentistry, and major challenges for the future. He noted that Dr. Slavkin's leadership and vision of the future of dental materials profoundly influenced his own research, which he redirected from a focus on internal organs to a focus on craniofacial tissue. His research aim is to regenerate or engineer new, normal tissue structure. Dr. Mooney noted that this research complements past and current research on dental materials (e.g., ceramics, metals, polymers), which has benefited many patients and will continue to do so in the future but is limited in comparison.

Investigators are pursuing three general strategies of tissue reengineering: conduction (or "guided tissue regeneration"), which is widely used in dentistry and involves placement of cells at specific sites to regenerate tissue; induction, or the delivery of induction factors at sites to encourage cells to move into the sites to regenerate tissue; and transplantation of cells into specific sites. All tissues of the craniofacial complex are being studied. Dr. Mooney elaborated on the latter two processes, cell transplantation and induction. He noted that Dr. Slavkin and several NIDCR scientists have been pioneers in these areas.

With respect to cell transplantation, Dr. Mooney said that researchers are able currently to grow tissue (e.g., cartilage) in defined sizes and shapes for introduction into the body, but can only approximate the properties of native cartilage. The next research step is to improve the technique to be able to replicate the structure and function of native tissue. In in vitro studies, he and other researchers are exploring the mechanics of cell adhesion and the interaction of cells and matrices in the regulation of gene expression of cells in engineered tissues. They have shown that, by modifying the chemistry and mechanical properties of an alginate model system, they can control the ability of cells to multiply. This important general principle is applicable to all biomaterials for medical devices and has broad implications for dentistry and medicine. Dr. Mooney noted that the chemical aspects of the principle have been tested, with positive effect, in animals, and researchers hope to be able to control the mechanical effects within a year.

With respect to induction, Dr. Mooney noted that researchers have made the most progress in utilizing inductive molecules to promote formation of new bone. This approach is currently being evaluated in phase III clinical trials. Dr. Mooney said that the strategy has broad utility and that other trials (e.g., of periodontal regeneration) are under way. Molecules that can be used to control local tissue formation include diffusible-signal molecules, solid-phase extracellular matrix molecules, and purified or recombinant proteins (e.g., bone morphogenic proteins). Researchers are also studying ways to induce the blood vessel formation needed to metabolically support tissue and to integrate it with the body. In other research, Dr. Mooney and colleagues are combining the use of inductive molecules and cell transplantation to grow large masses of tissue in relatively short periods of time. One approach, based on gene therapy, involves incorporation of plasma DNA into a polymer scaffold to drive tissue formation. This approach has implications for achieving controlled, sustained delivery of high concentrations of drugs locally while maintaining low concentrations systemically.

Dr. Mooney expressed optimism about the advances being made using these different strategies and approaches to develop a new generation of biomaterials capable of influencing tissue formation. He noted that the challenges for the future involve scientific, ethical, and social concerns. Major issues relate to the types of cells used (e.g., embryonic or other stem cells, autologous or allogenic cells), the populations served (e.g., the longevity of engineered tissue for newborns or children, the tissue response of elderly patients), and the economics (e.g., costs) of these therapies.

In discussion, Dr. Mooney suggested that universal cells which can be used in different people will need to be developed in order for the therapies to become routine, economically acceptable, and widespread. He anticipated that the costs of therapy will be high initially and decrease over time, and he noted that industry's investment in the research will be significant. He noted that, clinically, inductive proteins are likely to be used first in the craniofacial complex to replace infected periodontal bone and that cell transplantation could be applied almost immediately to repair small craniofacial defects.

Craniofacial Genetics

Dr. Judy A. Small, Chief, Craniofacial Anomalies and Injuries Branch, DER, noted that hundreds of genetic disorders include craniofacial anomalies. At the NIDCR, genetics research broadly includes genetic syndromes and diseases, genomic research (e.g., gene mapping), and gene expression (e.g., microbial genomics). The largest number of grants in genetics research is administered by the Craniofacial Anomalies and Injuries Branch, and the remaining grants are distributed evenly across the other five branches. Research project grants (R01s) administered by the DER account for approximately 59 percent of NIDCR's portfolio of genetics research, and the DIR accounts for approximately 27 percent.

Dr. Small noted that NIDCR support for genetics research has increased steadily. Between FY 1997 and FY 1999, funding for R01s in genetics research increased from $38 million to $58 million, rising from less

than 35 percent of all extramurally supported R01s to more than 41 percent. To help guide NIDCR efforts in this area, the Institute convened three conferences in Bethesda, Maryland, during 1999: Genetics and Craniofacial and Dental Anomalies: Genetics Workgroup, held November 14-16; Genetics of Human Dentition, held September 13; and Prevention of Craniofacial Anomalies, held September 21-22.

Dr. Mary Marazita, Interim Director of Research and Professor, School of Dental Medicine, University of Pittsburgh, Pennsylvania, described the recent explosion of knowledge and understanding of the genetics of the craniofacial complex, noting that most of this research has been funded by the NIDCR. She reviewed the history of craniofacial genetics research, advances in understanding the development of craniofacial anomalies, successes in gene mapping of syndromic disorders, progress in research on cleft lip and cleft palate (CL/CP), and future research directions. She noted that Dr. Slavkin's enthusiasm for craniofacial biology first attracted her into the field as a new postdoctoral investigator, and, on behalf of all craniofacial researchers, she thanked him for "putting the 'C'" in NIDCR.

Dr. Marazita noted that the history of genetics is closely bound to the history of craniofacial genetics in the broad sense (i.e., including dental and oral genetics). She characterized the 1900s as the century of genetics, a time when scientists conceived and developed understanding of the concepts of genes, genetics, and inheritance and also developed the necessary methods and tools for exploring genetics in humans and other organisms. She noted that craniofacial anomalies, and particularly CL/CP, were the focus of many early debates about Mendelian inheritance and that the foundation of molecular genetics, laid during the 20th century, has poised researchers for the "dawning of the age of genetic medicine and dentistry" as we enter the 21st century.

Advances in understanding normal craniofacial development have largely come from observations and studies of abnormal development. Representations of craniofacial anomalies have been depicted in art objects for centuries. Although at least 300 craniofacial syndromes have been identified, they account for perhaps 15 percent of all craniofacial disorders; most anomalies are nonsyndromic (e.g., CL/CP). Known causes include autosomal inheritance within families, spontaneous chromosomal rearrangements, and environmental teratogens.
Specific causes of syndromic disorders include having extra genomic material (e.g., trisomy-13) or lacking chromosomal material (e.g., microdeletions in chromosomes 4 or 22). To unravel the genetics of these disorders, researchers are applying molecular and statistical tools. Laboratory investigations are being combined with case-control and other family-based approaches to screen large numbers of genes, to focus on selected chromosomal regions, and to search for specific mutations. Researchers also are utilizing animal models, studying natural and experimental chromosomal rearrangements, and probing leads in gene expression libraries. These efforts have led to major successes recently in mapping the genes for a number of craniofacial syndromes, including Stickler syndrome, ectodermal dysplasia, van der Woude syndrome, and the craniosynostosis syndromes (e.g., Crouzon syndrome). This information is useful clinically for refining the classification of disorders and for defining individuals and families at risk of developing the disorders.

Dr. Marazita noted that the NIDCR is tracking genetic information on 47 targeted categories of disorders. This database, which will be accessible on the NIDCR home page, already indicates that researchers have identified genes for 36 categories, known inheritance patterns for 42 categories, allelic variants for 12 categories, animal models for 19 categories, additional systemic disease for 6 categories, and parental-age effects for 3 categories.

During the past 10 years, scientists also have made significant progress in understanding the nonsyndromic disorders, particularly CL/CP. These disorders are especially complex because of the interaction of multiple genes and of environmental factors. Dr. Marazita noted that CL/CP occurs in all populations worldwide and has a higher prevalence at birth among certain populations (e.g., Native Americans and Asians). Scientists have applied genetic and epidemiological approaches in demographic, inheritance pattern, case-control, gene mapping, and gene sequencing and cloning studies to understand the transmission of these disorders. For CL/CP, studies indicate a positive association with various environmental factors (e.g., use of retinoic acid, anticonvulsants, alcohol; multiple deficiencies of vitamins and minerals, including zinc, biotin, folate; maternal smoking); inheritance patterns involving 4 to 6 genetic

loci (and 4 to 20 loci for CP alone); and involvement of different chromosomes and genes (e.g., chromosome 2, 4, 6, 14, 17, 19). Dr. Marazita noted that the results of gene mapping studies, which have been conducted in both humans and mouse models, are not consistent. Particular genes that appear to be important for craniofacial development include the homeobox genes and the genes for transforming growth factors (TGF)-alpha and TGF-beta. In her laboratory, researchers are pursuing other phenotypic variables (e.g., subclinical features, developmental asymmetry) which may represent subclinical expression of the gene(s) for clefting.

In closing, Dr. Marazita commented on the tremendous gains that have been made in mapping the human genome and the availability of mammoth computerized databases for tracking known genes. Researchers are already using this information to define the function of genes. She noted that the 21st century will be an era of "genetic *knowledge* engineering," for both craniofacial genetics and human genetics, as scientists strive to make sense of the genetic information obtained over the past 25 years. In discussion, Dr. Marazita noted that development of a "tool kit" containing microarrays of single nucleotide polymorphisms (SNPs) would be immeasurably useful for conducting genetics research in the field.

Research Training and Career Development

Dr. James A. Lipton, Assistant Director, Office of Training and Career Development, DER, noted that the exciting and challenging scientific areas discussed by the previous speakers will not progress far without outstanding minds to conduct the research. Science in general, and dental and craniofacial research in particular, are experiencing a shortage of new, well-trained scientists. Within dental schools alone, approximately 350 faculty positions, many of which include research, remain unfilled.

Dr. Lipton said that the NIDCR is addressing this problem. With Dr. Slavkin's insight and vision, the Institute convened the Blue Ribbon Panel on Research Training and Career Development to Meet Scientific Opportunities of the 21st Century. The panel, which was cochaired by Drs. Charles Bertolami and Joseph Martin, met in July 1999, drafted recommendations which were discussed by the Council in September 1999, and presented its final report in January 2000. In response to the report, the Institute drafted an implementation plan, which was presented to the Council in January 2000 and finalized by March 2000. Both documents are available on the NIDCR home page.

Since March, the NIDCR has implemented several initiatives in response to the panel's recommendations. These actions include announcement of a new NIDCR Scholar Development and Faculty Transition Award (K22) and a comprehensive Institutional National Research Service Award (T32), planning of a new Mentored Clinical Scientist Development Program Award in Dental, Craniofacial, and Oral Health Research (K12), and discussion of ways to implement networks of research training excellence beginning at least at the high school level.

Dr. Charles Bertolami, Dean, School of Dentistry, University of California at San Francisco, commented on the changes in research training and career development during the past 5 years and suggested a framework for "seizing" opportunities in the future. He noted that Dr. Slavkin's tenure as NIDCR director is well characterized by the term seize, whether defined as "to grasp and understand fully" or as "to convulse and shake up."

Dr. Bertolami noted that the changes over the past 5 years have been immense. Five years ago, most dental school faculty did not use the Internet, the only search engines available were essentially gophers, dental scientists did not have access to Internet graphics, and e-mail communications within institutions were difficult. Within 5 years, managed care has become a dominant form of health care in the United States, and Americans' health consciousness has expanded considerably. Dr. Bertolami noted that, currently, "there is no steady nesting place in [the] rushing river [of the] biomedical sciences" and that Dr. Slavkin embodies the fact that "the future belongs to those who see possibilities before they become obvious." He said that Dr. Slavkin has greatly helped the dental profession visualize these possibilities and has posed an important question: Will dentistry be invited to participate in the oral health care of the public in the future?

Dr. Bertolami suggested that, to have something to offer, the dental profession needs to rethink its traditional research training and career development programs and, in particular, to prepare to cope with the implications of oral health being a part of general health. He noted that, with Dr. Slavkin's leadership, the NIDCR has incorporated training components into its research initiatives and has extended discussions about the scientific pipeline to include all levels of education.

Dr. Bertolami noted that the Blue Ribbon Panel was one of many NIDCR panels convened by Dr. Slavkin to participate in the Institute's decisionmaking process. The panel's thinking reflected the need to place high priority on interdisciplinary and multiprofessional research and research training. Urged by Dr. Slavkin to think "outside the box," the panel emphasized two key words: collaboration and leverage. Dr. Bertolami noted that, through collaboration and the leveraging of resources, the NIDCR is already creating a "whole greater than the sum of the parts" and that the recipients of NIDCR funds are being urged to do the same.

A major paradox to be addressed is the dearth of medical and dental students interested in research at a time that has been characterized as "the golden era of biomedical research." Following Dr. Slavkin's lead in confronting problems and defining solutions, Dr. Bertolami highlighted two concerns pertinent to research training: the disappearance of traditional disciplinary lines of research, and the progressive decline of first-time M.D. and D.D.S. applicants for NIH research project grants. Commenting on the first concern, Dr. Bertolami noted that research training in the future "will be messy." With regard to the second concern, he noted that the "2 percent solution," a common refrain in dentistry, is not being met. Instead of the 2 percent of dental school graduates nationwide entering academic/research careers, which is needed to maintain a robust dental educational and research enterprise, only 0.5 percent are choosing this option. A significant bellwether for the future is students' decreasing interest in clinical disciplines, which is dramatically indicated, for example, by the past year's more-than-11-percent drop in applications to dental schools and 30-percent drop in number of individuals taking the dental aptitude test. Instead, students are choosing to pursue other intellectually exciting fields, such as computer sciences and informatics.

Dr. Bertolami emphasized the need to better understand students' interests and to better communicate the immense excitement of medical research. He noted that, compared to previous generations, the students' today are less interested in titles and degrees or in finding "a steady nesting place in the rapidly rushing river," and they appear to be more focused and to enjoy multitasking and multicareers--attributes that fit well with the private sector but not necessarily with the traditional structure of American universities. Indeed, some individuals have already made outstanding contributions to dentistry through the private sector. Dr. Bertolami highlighted three major advances achieved by private-sector researchers: osseointegrated dental implants, guided tissue regeneration, and a computer-generated orthodontic appliance (Invisalign®) for adults. These accomplishments arose from individuals (who were not all dentists) who perceived and "seized" intellectually exciting opportunities that others considered impossible. Each of these advances is having a major effect on the practice of dentistry. Similar, and greater, effects are expected from the confluence of oral health and fields such as molecular design, pharmacology, and bioengineering.

Dr. Bertolami noted that, during Dr. Slavkin's tenure, the NIDCR has made significant strides toward redesigning its research training and career development program to meet the challenges of the future. Within the past 4 years, NIDCR-supported full-time training positions have increased by more than 15 percent, more training positions are multi- and cross-disciplinary, and the stipend level for full-time trainees has increased by almost 40 percent. In closing, he noted two essential points: the individuals who will usher in the research of the future are already in the pipeline, and those who are in the pipeline or soon coming into the pipeline have to be carefully selected and cultivated in a way that fosters collaboration and innovation.

In discussion, Dr. Bertolami commented on the scientific pipeline and research facilities. He noted that research and recruitment of scientists are international in nature; dental schools may need to broaden their recruitment efforts; dentists and dental schools, which tend toward isolation, need to be more collaborative; oral health research is being conducted effectively and collaboratively in a variety of venues (e.g., dental

schools, research institutions, private companies); and continued efforts are needed to increase and sustain the participation of underrepresented minorities in research.

IX. CONCEPT CLEARANCES

NIDCR staff presented two concepts for Council's review and approval. The Council also discussed a third concept which the members had reviewed previously by mail.

New Approaches to the Etiology, Pathogenesis, and Treatment of Orofacial Pain

Dr. Kenneth A. Gruber, Chief, Chronic Diseases Branch, DER, presented a concept to stimulate research grant applications for innovative basic research on the pathogenesis of orofacial pain, particularly temporomandibular disorders (TMDs) and associated orofacial pain. Through a Program Announcement, the NIDCR would seek to encourage a broad range of research proposals on pathogenic mechanisms, new animal models, and interventions to halt and reverse disease processes. The Institute also would invite applications proposing designs and hypotheses for development of novel bioengineering approaches to the repair and regeneration of the temporomandibular joint (TMJ) and for development of imaging technologies of the orofacial region. Orofacial pain, and particularly that associated with TMDs, affects at least 10 million people, primarily women, in the United States. The TMDs are an important national health problem that, for many individuals, interfere with normal occupational and social activities. Greater attention to this problem is warranted by recent advances in understanding the physiology, molecular biology, and pathology of the craniofacial musculature; sex-mediated differences in sensitivity to pain and in TMJ integrity; and characterization and rational synthesis of biomaterials. By coupling these advances in integrated, multidisciplinary research involving dental and other scientists, it may be possible to improve understanding and treatment of TMDs and related conditions.

The Council unanimously approved the concept.

Development of Technologies for Saliva and Other Oral Fluid-Based Diagnostics

Dr. Eleni Kousvelari, Chief, Biomaterials, Biomimetics, and Tissue Engineering Branch, DER, presented a concept to promote multidisciplinary research on the development and utilization of new technologies for in vitro and in vivo simultaneous detection of multiple components in saliva and other oral fluids. The NIDCR envisions that emerging technologies such as miniaturized analytical systems, microfluidics, and micro-nanosensors can be utilized to analyze oral fluid-derived components (e.g., cells, DNA/RNA, proteins, hormones, drugs, metabolic products) for insights into health and disease. The Institute would issue an RFA which will be focused primarily in three areas where saliva or other oral fluid-based diagnostics can have major impact: (a) oral diagnostics (e.g., for periodontal diseases and dental caries); (b) systemic disease diagnosis (e.g., of autoimmune diseases, cardiovascular disease, and cancer); and (c) drug monitoring (e.g., drug compliance, pharmacokinetics, and pharmacogenomics). Oral fluid-based diagnostics may be more accessible and accurate, less expensive, and entail less risk than other current methodologies. Oral fluids, particularly saliva, have been used for many years to diagnose systemic disease, but their utilization has progressed slowly. Recent advances in biology, physics, instrumentation, and engineering promise to revolutionize diagnostics and can be applied to the design and development of a new generation of diagnostic technologies utilizing saliva and other oral fluids. The RFA will reflect the recommendations of an NIDCR workshop on this topic, which was held at the NIH in September 1999.

The Council unanimously approved the concept.

State Models for Oral Cancer Prevention and Early Detection

Dr. Ann L. Sandberg, Chief, Neoplastic Diseases Branch, and Director, Comprehensive Centers of Discovery Program, DER, noted the Council's review, by mail, of a concept for a two-phase initiative for the prevention and early detection of oral cancer. The NIDCR proposes to issue two RFAs from statewide partnerships interested in reducing the burden of oral cancers. The Institute would support epidemiological needs assessments of oral cancer; research on the knowledge, opinions, and practices of the public and of health professionals regarding prevention and early detection of oral cancer; and development, testing, and evaluation of educational interventions for the public and health professionals. The first RFA would be for Phase I exploratory/developmental grants to support establishment of organizational infrastructures and the needs assessment; the second, follow-on, RFA would be for Phase II research project grants to support development and testing of interventions and program evaluation. Oral cancers represent 3 percent of all cancers in the United States, but have one of the lowest 5-year survival rates of any of the major cancer sites, which is attributed to diagnosis at advanced stages. These cancers and their treatment are extremely disfiguring and involve severe loss of oral function. Awareness of oral cancer and interventions for oral cancer may differ among states and reflect the demographics of a state. A state model offers the best approach for reaching health professionals and the public, including at-risk groups. The statewide partnerships would include state medical and/or dental directors and academic health centers, as well as other organizations (e.g., government agencies, schools and universities, religious organizations, consumer groups, businesses, youth agencies, health associations).

The Council unanimously approved the concept.

X. CONCLUDING REMARKS

Dr. Slavkin thanked the participants for their accolades and tributes, noting that they should be reflected to NIDCR's executive staff, who have worked with him over the past 5 years to "push the envelope" and "make it happen." He said that, together, they discovered that "anything is possible" and that he has benefited from "being in the right place at the right time." With the support of the NIH leadership, NIDCR has been able to develop and pursue a robust scientific agenda. Dr. Slavkin revisited the issue of diversity and the scientific pipeline, reminding everyone of the importance of being able to recruit scientific talent worldwide and of strengthening the science curricula domestically at all educational levels. He urged everyone to address the needs of science realistically and to cultivate individuals who are interested in investing themselves in a research career. He thanked the participants again and said he looked forward to "the next chapter" of his career.

CLOSED PORTION OF THE MEETING

This portion of the meeting was closed to the public in accordance with the determination that it was concerned with matters exempt from mandatory disclosure under Sections 552b(c)(4) and 552b(c)(6), Title 5, U.S. Code and Section 10(d) of the Federal Advisory Committee Act, as amended (5 U.S.C. Appendix 2).

There was a discussion of procedures and policies regarding voting and confidentiality of application materials, committee discussions, and recommendations. Members absented themselves from the meeting during discussion of and voting on applications from their own institutions, or other applications in which there was a potential conflict of interest, real or apparent. Members were asked to sign a statement to this effect.

XI. REVIEW OF APPLICATIONS

Grant Review

The Council considered 484 applications requesting $90,910,584 in total costs. The Council recommended 348 applications for a total cost of $$61,580,631 (see Attachment II).

ADJOURNMENT

The meeting was adjourned at 12:30 p.m. on June 9, 2000.

CERTIFICATION

I hereby certify that the foregoing minutes are accurate and complete.

_____	_____
Dr. Harold C. Slavkin	Dr. Dushanka V. Kleinman
Chairperson	Executive Secretary
National Advisory Dental and	National Advisory Dental and
Craniofacial Research Council	and Craniofacial Research Council

ATTACHMENTS

I. Roster of Council Members
II. Table of Council Actions
III. Director's Report to the NADCRC, June 2000

NOTE: A complete set of open-portion handouts are available from the Executive Secretary.